

Study Shows Honey Bees Exposed to High Levels of Bee-Killing Pesticide



(Beyond Pesticides, January 10, 2012) A Purdue University study shows that honey bees' exposure to the highly toxic neonicotinoid pesticide **clothianidin**, as well as thiamethoxam, is greater than previously thought. Beyond Pesticides, as a part of a coalition of beekeeping and environmental groups, challenged the Environmental Protection Agency (EPA) in a **December 2010 letter** for allowing the continued use of this bee-killing pesticide after EPA admitted in a leaked memo that its field study on bees is inadequate. The study, "**Multiple Routes of Pesticide Exposure for Honey Bees Living Near Agricultural Fields**," was published January 3, 2012 in the online edition of *PLoS ONE*.



Like other neonicotinoid pesticides, clothianidin is a systemic pesticide, which is taken up by a plant's vascular system and expressed through pollen, nectar, and guttation droplets. It is most commonly applied by seed treatment. Most pesticides that are toxic to bees carry a warning that the product cannot be applied while foraging bees are present. As this study shows, systemic pesticides continue to expose and poison bees throughout foraging season. The study authors decided to take a closer look at clothianidin routes of exposure because of its prevalence in honey bee pollen and comb material, combined with its high toxicity to bees and global bee decline.

Using liquid chromatography–mass spectrometry to analyze samples of honey bees, pollen stored in the hive, and several potential exposure routes associated with plantings of neonicotinoid treated corn, the researchers demonstrate several routes of exposure, some not previously accounted for in EPA's evaluation for approval under federal pesticide regulations.

During the spring planting season, the researchers found extremely high levels of both clothianidin and another neonicotinoid, thiamethoxam, in planter exhaust material produced during the planting of seed treated corn. The field soil is also found to be contaminated with these neonicotinoids, including unplanted fields. Plants visited by foraging bees, dandelions in particular, growing near these fields were found to contain neonicotinoids in their plant material as well. According to the research team, this indicates deposition of neonicotinoids on the flowers, uptake by the root system, or both.

During the spring, when neonicotinoid levels are highest, dead bees collected near hive entrances were found to contain clothianidin as well, although whether exposure was oral (consuming pollen) or by contact (soil/planter dust) is unclear. Clothianidin is also detected in pollen collected by bees and stored in the hive.

After the spring planting season, bees foraging through the summer continue to be exposed. When the corn begins to flower, the pollen is also contaminated with clothianidin and other pesticides. The authors note that the levels of clothianidin in bee-collected pollen that they sampled are approximately 10-fold higher than reported from experiments conducted in canola grown from clothianidin-treated seed. This is a critical finding, because clothianidin is even more toxic orally, as they would be exposed through pollen, rather than by spray contact. Advocates maintain that all of these findings must be evaluated by EPA as part of its registration process.

Clothianidin is in the neonicotinoid family of systemic pesticides, which are taken up by a plant's vascular system and expressed through pollen, nectar and guttation droplets from which bees forage and drink. Scientists are concerned about the mix and cumulative effects of the multiple pesticides bees are exposed to in these ways. Neonicotinoids are of particular concern because they have cumulative, sublethal effects on insect pollinators that correspond to CCD symptoms – namely, neurobehavioral and immune system disruptions.

According to James Frazier, Ph.D., professor of entomology at Penn State's College of Agricultural Sciences, "Among the neonicotinoids, clothianidin is among those most toxic for honey bees; and this combined with its systemic movement in plants has produced a troubling mix of scientific results pointing to its potential risk for honey bees through current agricultural practices. Our own research indicates that systemic pesticides occur in pollen and nectar in much greater quantities than has been previously thought, and that interactions among pesticides occurs often and should be of wide concern." Dr. Frazier said that the most prudent course of action would be to take the pesticide off the market until EPA has the data necessary to fully evaluate the pesticide's affect on bees.

Clothianidin has been on the market since 2003. With a soil half-life of up to 19 years in heavy soils, and over a year in the lightest of soils, commercial beekeepers are concerned that even an immediate stop-use of clothianidin won't save their livelihoods or hives in time.

For more information on pesticides, honey bees and other pollinators, as well as what you can do, see Beyond **Pesticides Pollinator Protection** program page. Tell EPA it must consider this study as part of its reregistration process. Submit a comment [here](#).

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